

Engineering Challenge - Student Packet

Due Dates Checklist

Check	Date	Assignment
	Thurs. 11/2	Project proposal (Problem Definition) page - This is the last page of this packet. You will rip it off and turn it into Ms. Dobler.
	Thurs. 11/30	Background Research - More information about background research can be found on page 3 of this packet and in the packet student's will receive from Ms. Hamm in November.
	Thurs. 12/14	Preliminary design, preliminary prototype, and design testing plan complete (be sure to take a picture of your prototype before modifying) - Details on page 4
	Thurs. 1/11	Revised design and revised prototype
	Thurs. 2/1	Final Project is due and displayed at the WLPCS STEM Fair

Students will also present in class during the week of 1/22 - 1/26.

Note: Student will receive another packet after Thanksgiving Break that includes detailed directions for the last three deadlines.

Project Overview

This project asks you to follow the engineering design process. Engineering is the application of scientific and practical knowledge to solve a problem. In addition to brainstorming solutions, the engineering process also involves the process of testing and redesigning in order to create a better product.

In order to be successful with an engineering challenge project, you will:

1. Define a problem - This can be any problem or need you see in the world around you. You want to ensure that you are specific when you define the problem, including what the problem is, who has the problem, and why it is worthwhile to solve the problem. Part of defining a problem is also thinking about what a solution would accomplish.
2. Explore/Research your topic - In order to successfully design a solution to your problem, you need to deeply understand the topic. This includes researching facts about the problem (learning about how cars work if your problem is related to cars), researching the science concepts behind the problem (learning about electricity if you are designing a more efficient windmill), and what solutions have been tried in the past. Ms. Hamm will help get you started with the background research during the first week of November.
3. Design and create your first prototype - Engineers always design first. Your designs may be on the computer or on paper, but ensure they are kept, as they will be an integral part of your final presentation. Think about what materials to use, how large or small your device needs to be, and all the parts will work together before you begin to build. Once your initial plans are finalized, you can begin building. Be sure to take pictures of your finished product before you begin testing.
4. Test your prototype - This step asks you to think about to your defined problem. What would a solution to this problem look like? How well does your prototype solve the defined problem? What works? What does not work? What could be better?
5. Redesign, rebuild and retest - Based on your test results, think about how you can redesign your prototype so that it better solves the problem. Like before, you will write out a design plan (paper or computer) before beginning a rebuild. Then retest to see if it actually works better. You should go through the redesign and retest process at least 2 times. The more times you redesign, the better your solution will be. Be sure to carefully document each redesign and rebuild so you can include it all in your final product.
6. Display your work - Create a tri-fold display showcasing your work, including the initial research and problem, final prototype, and how the prototype has evolved over time.

Background Research

Product: Due Thursday 11/30

Completed Source Saver and Notes document.

- This document is found in classroom.google.com
- This is the document Ms. Hamm introduced in November
- All **three** sources should be finished

You will turn in at least one full paragraph of research specifically related to your Science Fair topic. A full paragraph means at least 7 sentences. This paragraph will demonstrate that you deeply understand your Science topic. This includes researching facts about the problem (learning about how cars work if your problem is related to cars), researching the science concepts behind the problem (learning about electricity if you are designing a more efficient windmill), and what solutions have been tried in the past.

Need help finding good sources? Check out the LiveBinder link below (or on the wiki) for a wide variety of pre-approved Science research resources.

[Link to Resources for Research](#)

Preliminary Design, Prototype, and Testing Plan

Product: Due Thursday 12/14

The document, titled **Engineering Challenge - Preliminary Design, Prototype, and Testing Plan** can be found in classroom.google.com.

You should follow the prompts in the document to upload an image and write a description of your initial solution design. Remember that your design plan should be as specific as possible, including notes about the sizes, materials, and purposes of each part of your prototype.

You will also answer questions about how you will test your prototype and write a testing plan. You want to be as specific as possible. Just like an experimental procedure, anyone should be able to pick up your testing plan and repeat exactly what you did.

Note: When you finish, delete the “hints” at the beginning of each section.

Grading Rubric - Engineering Challenge

Remember that Science Fair counts as much as a test grade.

_____ **Prep Work (45)**

_____ Background Research (9 - 3 sources, 6 - 1 paragraph)

_____ Design/Plan (15 - 3 points per section)

_____ Rough Draft (15 - Includes all elements of plot, science connection, illustrations)

_____ **Display Board (35)**

_____ Content (25 – all, 2.5 point each otherwise)

(Title, Background, Question, Solution Criteria, Testing Method,
Initial Prototype, Testing Results, Modification(s), Impact/significance, Images)

_____ Readability (5 – font is neat & large enough to be read from several feet away)

_____ Professional and Creative (5 – neat, colorful, ordered)

_____ **Oral Presentation (15)**

_____ Content Knowledge (8 – full understanding, describes in detail, answers questions)

_____ Presentation Organization (3 - On Topic, Logical Order)

_____ Time Limit (2 - 4-6 minutes)

_____ Professionalism (2 - Posture, Eye Contact, Clear Speech, Volume)

_____ **Works Cited (5)** (5 – MLA; 2 – included)

Name _____

Period _____

Proposal Form (Engineering - Problem Definition)

Due Thursday November 2nd.

1. Write the problem or human need you hope to solve with your engineering challenge. Be sure to explain what the problem is, who has the problem, and why the problem needs to be solved.
2. Give a brief summary (2-3 sentences) explaining how you might solve the problem or the type of prototype you might create. It is okay if this changes later!

If you are working with a partner/group of three, please fill out the questions below. Signing below means that you and your parent understand that this is an out of class project and have carefully thought through how and when you are going to get together with your partner to work.

1. Partner(s) _____

2. Parent Signature _____